**Amendments to the Drawings:**

The attached sheet of drawings includes new FIGS. 12 and 13.

Attachment: New Sheet

**Remarks:**

## I. SUMMARY OF CLAIMED SUBJECT MATTER

The present invention provides a modular computer system, including a cooling system. Under the invention, a multi-tiered support receives, a computer chassis configured for mounting in the multi-tiered support.

In a first variation of the invention, the computer chassis includes a plurality of computer components cooled by a plurality of respective cold plates using a coolant. The coolant is part of a closed loop cooling system, from which heat is dissipated by a heat exchanger. The closed loop cooling system is configured to cool first and second computer components in parallel, and a control system is configured to control the relative rate of coolant flow to the first and second computer components.

In a second variation of the invention, the heat exchanger includes a first heat-exchanger portion and a separate second heat-exchange portion. The first and second heat-exchanger portions each have coolant passageways having two ends. The first heat-exchanger portion coolant passageways are separated from coolant passageways of the second heat exchanger portion by one or more of the plurality of cooling devices at each end of the heat-exchanger passageways.

In a third variation, the heat exchanger is in turn cooled with a fluid. The fluid is received by the computer chassis from the multi-tiered support via a connection. The computer chassis includes passageways configured for cooling the heat exchanger with the fluid received from the connection.

## II. GROUNDS OF REJECTION

Ground 1. The drawings were objected to as being required to show parallel components and an external heat sink, and for lack of depiction of elements, claims 1-12 and 20 were rejected under 35 U.S.C. § 112.

Ground 2. Claims 30-37 were rejected under 35 U.S.C. § 112.

Ground 3. Claims 1, 2, 5-7, 9, 10, 12, 16, 17-19, 20, 27 and 30-37 were rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Novotny et al. in view of Cheon, or alternatively in view of Lopez, U.S. Pat. No. 5,509,468.

Ground 4. Claims 3 and 4 were rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Novotny et al. in view of Cheon, and further in view of Wu.

Ground 5. Claim 8 was rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over Novotny et al. in view of Cheon, and further in view of Casebolt.

Ground 6. Claims 38 and 39 were rejected under 35 U.S.C. § 102(e), as allegedly unpatentable over anticipated by Cheon.

Ground 7. Claims 1-10, 12, 16-20, 27 and 30-39 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-23 of copending Application No. 10/772,115.

## III. NEW DRAWINGS AND AMENDMENTS TO THE SPECIFICATION

New figures 12 and 13 have been added to the application. The Brief Description of the Drawings and three paragraphs of the Detailed Description of the Preferred Embodiments have been amended to reflect the addition of the new figures.

No new matter is added by this Amendment. Applicants note that every feature of new Figures 12 and 13 are fully disclosed in the original paragraphs that have been amended above. These paragraphs provide variations on embodiments of the invention, and thus further support for these figures is found throughout the application where those embodiments are discussed.

## IV. GROUND #1: Objection to the Drawings and Related Rejections

The drawings were objected to as being required to show parallel components and an external heat sink, and for lack of depiction of elements. More particularly, the Office Action cited that the drawings required depiction of parallel components and an external (to the chassis) heat sink. The added figures address this allegation.

Claims 1-12 and 20 were rejected under § 112 because they included elements that were allegedly not shown in the drawings, as discussed with regard to the objections to the drawings. The amended drawings address this issue. Applicants therefore respectfully request the rejections under § 112 to claims 1-12 and 20 be withdrawn.

## V. GROUND #2: Vague and Indefinite Under 35 U.S.C. § 112

Claims 30-37 were rejected under § 112 over wording issues. Claim 30 has been appropriately amended. Applicants therefore respectfully request the rejection under § 112 of claims 30-37 be withdrawn.

## VI. GROUND #3: Obviousness over Novotny et al. in View of Cheon, or Alternatively in View of Lopez.

A. Claims 1, 2, 5-7, 9, 10, 12 and 16-20 are patentable over Novotny et al. in view of Cheon, or alternatively in view of Lopez.

Independent claim 1 recites (in part):

> a control system configured to control the level of cooling provided to the first and second computer components;
>
> wherein the cooling system is configured to deliver coolant to the first and second computer components in parallel; and
>
> wherein the control system is configured to control the **relative rate of coolant flow** to the first and second computer components. [Emphasis added].

Similarly, independent claim 16 recites (in part):

> a control system configured to control the level of cooling provided to the first and second computer components;
>
> wherein the control system is configured to control the **relative level of cooling** between the first and second computer components. [Emphasis added].

Furthermore, independent claim 17 recites (in part):

> controlling the **relative level of cooling** between the first and second computer components. . . . [Emphasis added].

The Office Action correctly identifies that Cheon discloses a water cooling type cooling system for an electronic device, including a distribution device 30 having a plurality of ports so that a plurality of coolant circulation units 10 can be connected to a coolant supply unit 20 in parallel (see, [0054]). The cooling system includes a controller 28 that controls the rotation speeds of heat-dissipating fans to 21 and circulation pumps 23 (see, [0067]). The circulation pumps 23 are installed in the coolant supply unit 20, and are thereby isolated from the electronic device 1 (see, [0047]).

Cheon fails to disclose a control system configured to control the relative rate of coolant flow (or relative level of cooling) between first and second computer components. Figure 8 of Cheon clearly depicts the parallel configuration of the coolant circulation units 10 being separate from the heat-dissipating fans and the circulation pumps. Because the control system is only disclosed as controlling the heat-dissipating fans and the circulation pumps, and because the heat-dissipating fans and the circulation pumps are not configured to control the relative rate of coolant flow between the coolant circulation units, the control system cannot be configured to control the relative rate of coolant flow between the first and second computer components, and thereby, to control the relative level of cooling between the first and second computer components.

Ass depicted in FIG. 6 of Lopez, the Lopez patent discloses a manifold 26 that connects to a plurality of fluid conduits 48. The manifold receives coolant fluid from a fluid receptacle 76 via an elbow section 36. A flow rate controller 296 located between the fluid receptacle 76 and the elbow section 36 is operative to control the rate of coolant fluid flow through the manifold 26.

Likewise, Lopez fails to disclose a control system configured to control the relative rate of coolant flow (or relative level of cooling) between first and second computer components. Figures 1 and 6 of Lopez clearly depicts the parallel configuration of the fluid conduits 48, which are separated from the flow rate controller 296 by the elbow section 36. Because the flow rate controller is only disclosed as controlling the flow rate through the elbow section 36, the control system cannot be configured to control the relative rate of coolant flow between first and second computer components, and thereby, to control the relative level of cooling between the first and second computer components.

Because both Cheon and Lopez fail to teach or suggest a control system configured to control the relative rate of coolant flow or the relative level of cooling between first and second computer components, the office action fails to establish a prima facie case of obviousness for independent claims 1, 16 or 17. Dependent claims 2, 5-7, 9, 10, 12 and 20 incorporate the limitations of independent claim 1, and dependent claims 18 and 19 incorporate the limitations of independent claim 17. Accordingly, the rejection of claims

1, 2, 5-7, 9, 10, 12 and 16-20 under 35 U.S.C. § 103(a) is improper, and Applicants respectfully request it be withdrawn.

B. Claim 27 is patentable over Novotny et al. in view of Cheon, or alternatively in view of Lopez.

As depicted in figure 7, independent claim 27 recites (in part):

> wherein the heat exchanger includes a first heat-exchanger portion and a second heat-exchange portion, the first and second heat-exchange portions having coolant passageways **separated from one another** at both of two different ends **by one or more of the plurality of cooling devices**. [Emphasis added].

Referencing figure 15, the Office Action alleges that Novotny et al. discloses first and second heat exchange portions having coolant passageways separated from one another at both ends of two different ends by the cooling device 138. Applicants respectfully traversed this allegation. As noted in column 10, starting at line 33, figure 15 depicts a mounting plate 138 (coupled to an integrated circuit) connected to a heat sink 134 via a heat conductor 139. Clearly, they heat conductor 139 serves as a thermal conduit to the heat sink. There is no disclosure or suggestion that a cooling device separates the coolant passageways of two heat exchanger portions.

Because Novotny et al. fails to teach or suggest first and second heat-exchange portions having coolant passageways separated from one another at both of two different ends by one or more of the plurality of cooling devices, the office action fails to establish a prima facie case of obviousness for claim 27. Accordingly, the rejection of claim 27 under 35 U.S.C. § 103(a) is improper, and Applicants respectfully request it be withdrawn.

C. Claims 30-37 are not unpatentable over Novotny et al. in view of Cheon, or alternatively in view of Lopez.

Independent claim 30 recites (in part):

a multi-tiered support configured with a plurality of connections for connecting to a plurality of computer chassis, wherein the multi-tiered support defines passageways configured to deliver the fluid to each computer chassis connection;

a computer chassis configured to mount in the multi-tiered support, being configured to connect to a connection of the plurality of connections, and to receive the fluid from the connection; . . . and

wherein the computer chassis includes passageways configured for **cooling the heat exchanger with the fluid** received from the connection. [Emphasis added].

Novotny, Cheon and Lopez all fail to disclose a computer component cooled with a liquid coolant by a cold plate, the liquid coolant being cooled in a heat exchanger, wherein the heat exchanger is cooled by a fluid provided from a connection leading to passageways within a multi-tiered support. Because the cited art fails to teach or suggest the computer chassis including passageways configured for cooling the heat exchanger with the fluid received from the connection, the office action fails to establish a prima facie case of obviousness for claim 30. Dependent claims 31-37 incorporate the limitations of independent claim 30 Accordingly, the rejection of claims 30-37 under 35 U.S.C. § 103(a) is improper, and Applicants respectfully request it be withdrawn.

## VII. GROUND #4: Obviousness over Novotny et al. in View of Cheon, and Further in View of Wu.

Dependent claims 3 and 4 incorporate the limitations of independent claim 1. For the reasons recited above with respect to claim 1, the rejection of claims 3 and 4, under 35 U.S.C. § 103(a), is improper. Applicants respectfully request it be withdrawn.

## VIII. GROUND #5: Obviousness over Novotny et al. In View of Cheon, and Further in View of Casebolt.

Dependent claim 8 incorporates the limitations of independent claim 1. For the reasons recited above with respect to claim 1, the rejection of claim 8, under 35 U.S.C. § 103(a), is improper. Applicants respectfully request it be withdrawn.

## IX. GROUND #6: Anticipation by Cheon.

Similar to the recitation of independent claim 1, independent claim 38 now recites that the control system is configured to control the relative rate of coolant flow to the first and second computer components. Dependent claim 39 incorporates the limitations of independent claim 38. For the reasons recited above with respect to claim 1, the rejection of claims 38 and 39, under 35 U.S.C. § 102(e), is now improper. Applicants respectfully request it be withdrawn.

## X. GROUND #7: Double Patenting Rejection

Claims 1-10, 12, 16-20, 27 and 30-39 were rejected under the judicially created doctrine of obviousness-type double patenting. Applicants respectfully disagree that the claims of the present application are not patentably distinct from those of copending Application No. 10/772,115. Nevertheless, to provide for expeditious handling of the application, applicants enclose a terminal disclaimer in compliance with 37 C.F.R. § 1.321(c). In light of the terminal disclaimer, applicants respectfully request the double patenting rejection be withdrawn.

## XI. CONCLUSION

In view of the foregoing, Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

BASH et al.

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